

In the United States Court of Federal Claims
OFFICE OF SPECIAL MASTERS

* * * * *

SCOTT GERMAINE, Individually *
and on behalf of his minor grandson, *
C.G., *

Petitioner, *

v. *

SECRETARY OF HEALTH *
AND HUMAN SERVICES, *

Respondent. *

* * * * *

No. 18-800V
Special Master Christian J. Moran

Filed: March 9, 2020

entitlement; rotavirus vaccine;
intussusception.

Sean F. Greenwood, Greenwood Law Firm, Houston, TX, for petitioner;
Ryan D. Pyles, United States Dep't of Justice, Washington, DC, for respondent.

PUBLISHED DECISION DENYING COMPENSATION*

Scott Germaine filed a petition for compensation under the National Childhood Vaccine Injury Compensation Program, 42 U.S.C. § 300aa—10 to 34 (2012), alleging that the third dose of the rotavirus (RotaTeq) vaccine caused his grandson, C.G., to suffer intussusception. Pet., filed June 6, 2018. Because Mr. Germaine has not established a persuasive medical theory connecting the third dose of the RotaTeq vaccine with intussusception, Mr. Germaine is not entitled to compensation.

* The E-Government Act of 2002, Pub. L. No. 107-347, 116 Stat. 2899, 2913 (Dec. 17, 2002), requires that the Court post this decision on its website. Anyone will be able to access this decision via the internet (<https://www.uscfc.uscourts.gov/aggregator/sources/7>). Pursuant to Vaccine Rule 18(b), the parties have 14 days to file a motion proposing redaction of medical information or other information described in 42 U.S.C. § 300aa-12(d)(4). Any redactions ordered by the special master will appear in the document posted on the website.

Facts

The parties do not dispute C.G.'s medical history. Pet'r's Br., filed Mar. 18, 2020, at 1-3; Resp't's Br., filed June 9, 2020, at 2-3. Thus, the recitation of facts will be abbreviated to include only the most relevant events.

C.G. was born on March 7, 2016, without any serious issues. Exhibit 2 at 4. At a two-month well-baby visit, C.G. was assessed as normal and received the first dose of a rotavirus vaccine in addition to other routine vaccinations. Exhibit 3 at 37-39. C.G. was again assessed as normal during his four-month well-baby visit, where he received the second dose of a rotavirus vaccine among others. Id. at 33-36.

C.G. returned to his pediatrician on August 9, 2016, and Mr. Germaine reported that C.G. was experiencing congestion, cough, wheezing, rattling in chest, nasal discharge, fussiness, and fever. Id. at 31-32. The pediatrician diagnosed C.G. with acute bronchiolitis and prescribed a medication to treat it.

At his six-month well-baby visit on September 7, 2016, C.G. was no longer suffering from bronchiolitis symptoms and assessed as normal. Id. at 27-29. C.G. received the third dose of a rotavirus vaccine with his other regularly scheduled vaccines. Mr. Germaine alleges this dose harmed C.G.

Eighteen days later, on September 25, 2016, Mr. Germaine attested that C.G. began vomiting and experiencing diarrhea. Exhibit 1 ¶ 4. Mr. Germaine suspected that C.G. may have had a "stomach flu" because he and another member of the household had a "stomach flu" earlier that week. Id. After C.G.'s diarrhea turned bloody, Mr. Germaine realized that something was seriously wrong with C.G. and took C.G. to the emergency room that afternoon. Id.

At the emergency department, the attending physician ran a gastrointestinal panel on C.G. and the results came back as a positive for C. difficile toxin and norovirus but negative for adenovirus and e. coli.¹ Exhibit 4 at 15. The physician diagnosed C.G. with vomiting/diarrhea, dehydration, and bloody diarrhea. Id. at 6.

¹ In his brief, Mr. Germaine asserted that the Secretary is arguing that C.G. developed intussusception due to the adenovirus. Pet'r's Br. at 14. This assertion appears to be a clerical mistake because Mr. Germaine correctly stated later in his brief that the Secretary is arguing that norovirus caused C.G.'s intussusception. Pet'r's Br. at 16. The Secretary does not appear to have stated that C.G. suffered from an adenovirus infection, let alone that the adenovirus caused C.G.'s intussusception, in any of his filings.

C.G. was transferred to another hospital with the specialists needed for a higher-level of care. Id. at 5.

After his transfer, an ultrasound verified intussusception as the cause of C.G.'s gastrointestinal symptoms. Exhibit 5 at 9-10. Doctors unsuccessfully attempted to reduce C.G.'s bowels by catheter. Id. at 11. At this time, the treating physician advised Mr. Germaine that C.G. would need surgery to address the intussusception. Id. The physician admitted C.G. and scheduled his surgery for the next day. Id.

Intussusception occurs when the bowels either prolapse or telescope in on itself. Exhibit 6 at 5; exhibit A at 3. This unnatural movement of the bowels results in an intestinal obstruction causing symptoms of severe stomach pain, vomiting, and currant jelly stool. Young children under the age of two most frequently suffer from intussusception.

On September 26, 2016, the surgeon confirmed C.G.'s intussusception, removed a section of bowel, and performed an incidental appendectomy. Exhibit 5 at 31-33. On September 29, 2016, C.G. was discharged with final diagnoses of intussusception and status-post laparoscopic appendectomy. Id. at 71-73.

At a follow-up with his pediatrician on October 5, 2016, the pediatrician recorded the active problem as, "Intussusception - Per dad no rotateq to be given due to emergency surgery from side effect."² Exhibit 3 at 25. The pediatrician did not comment on the vaccine, and his assessment only stated, "Intussusception – recovery." Id.

Mr. Germaine brought C.G. for a post-surgical follow-up on October 18, 2016, reporting that C.G. was eating regularly, having normal bowel movements, having no pain, and was not having any fever. Exhibit 5 at 123-24. The physician noted that C.G. was doing well and that he would only need to return as needed.

In the most recently filed records, C.G. suffered from an ear infection in March 2018 but was well otherwise. Exhibit 26 at 16-18.

² While the medical record states that C.G.'s father conveyed the information about the RotaTeq vaccine, the record also states that C.G. was referred by his grandparents for this visit. It is possible that C.G.'s grandfather actually accompanied him during the October 5, 2016 visit.

Procedural History

Mr. Germaine presented an off-Table claim that the third dose of a rotavirus vaccine caused his grandson, C.G, to develop intussusception. Pet., filed June 6, 2018, at 1. Soon thereafter, Mr. Germaine confirmed submission of all medical records by filing a statement of completion.

Respondent opposed compensation. In the Rule 4 report, respondent argued that Mr. Germaine had not presented a medical theory to support intussusception following the third dose of the rotavirus vaccine, and that C.G. had a documented norovirus infection prior to his intussusception. Resp't's Rep., filed Oct. 1, 2018, at 4-5. At a status conference to discuss the report, Mr. Germaine proposed filing an expert report from a gastroenterologist to provide a medical theory. Order, issued Dec. 7, 2018. Finalized expert instructions subsequently issued. Order, issued Dec. 28, 2018.

On April 9, 2019, Mr. Germaine filed an expert report from Dr. John Santoro. Dr. Santoro noted that while the exact mechanism for the rotavirus vaccine to cause intussusception is unknown, epidemiological evidence supported a connection between rotavirus vaccines and intussusception. Exhibit 6 at 6-9.

On July 9, 2019, the Secretary filed an expert report from Dr. Chris Liacouras. Dr. Liacouras challenged Dr. Santoro's interpretation of the epidemiological evidence and argued that a norovirus infection caused C.G.'s intussusception. Exhibit A at 5-6.

Mr. Germaine filed a supplemental expert report from Dr. Santoro on November 14, 2019. Dr. Santoro responded to Dr. Liacouras by reiterating his prior positions. Exhibit 22. In a status report, the Secretary stated that he did not intend to file a responsive expert report. Resp't's Status Rep., filed Dec. 12, 2019. Since the expert report phase had concluded, the undersigned outlined the content for briefing. Order, issued Feb. 4, 2020.

On March 18, 2020, Mr. Germaine filed his brief and moved for a decision on the record. The Secretary filed his responsive brief on June 9, 2020. Mr. Germaine filed a reply brief without any substantive arguments but included a supplemental report from Dr. Santoro that contained substantive arguments. Exhibit 29. The Secretary stated via informal communications that he considered the briefing to be closed and did not believe that Dr. Santoro's most recent supplemental report raised any new issues.

After reviewing these submissions, the undersigned wanted to hear oral testimony from the experts. Order, filed Sep. 2, 2020. However, Mr. Germaine learned that his expert, Dr. Santoro, had died and Mr. Germaine decided to submit the case on the papers without retaining another expert. Pet'r's Status Rep., filed Nov. 2, 2020. Thereafter, Mr. Germaine filed another motion for ruling on the record on February 4, 2021. The Secretary responded on February 17, 2021. Mr. Germaine did not file a reply within the time the Vaccine Rules permit.

This matter is now ready for adjudication.

Standards for Finding Entitlement

A petitioner is required to establish his case by a preponderance of the evidence. 42 U.S.C. § 300aa–13(1)(a). The preponderance of the evidence standard requires a “trier of fact to believe that the existence of a fact is more probable than its nonexistence before [he] may find in favor of the party who has the burden to persuade the judge of the fact's existence.” Moberly v. Sec'y of Health & Human Servs., 592 F.3d 1315, 1322 n.2 (Fed. Cir. 2010) (citations omitted). Proof of medical certainty is not required. Bunting v. Sec'y of Health & Human Servs., 931 F.2d 867, 873 (Fed. Cir. 1991).

Distinguishing between “preponderant evidence” and “medical certainty” is important because a special master should not impose an evidentiary burden that is too high. Andreu v. Sec'y of Health & Human Servs., 569 F.3d 1367, 1379-80 (Fed. Cir. 2009) (reversing special master's decision that petitioners were not entitled to compensation); see also Lampe v. Sec'y of Health & Human Servs., 219 F.3d 1357 (Fed. Cir. 2000); Hodges v. Sec'y of Health & Human Servs., 9 F.3d 958, 961 (Fed. Cir. 1993) (disagreeing with dissenting judge's contention that the special master confused preponderance of the evidence with medical certainty).

Petitioners bear a burden “to show by preponderant evidence that the vaccination brought about [the vaccinee's] injury by providing: (1) a medical theory causally connecting the vaccination and the injury; (2) a logical sequence of cause and effect showing that the vaccination was the reason for the injury; and (3) a showing of a proximate temporal relationship between vaccination and injury.” Althen v. Sec'y of Health & Human Servs., 418 F.3d 1274, 1278 (Fed. Cir. 2005).

If a petitioner establishes a prima facie case, the Secretary can rebut by establishing an alternative cause of the petitioner's injury by a preponderance of the evidence. Snyder/Harris v. Sec'y of Health & Human Servs., 553 F. App'x 994, 999 (Fed. Cir. 2014). A special master may also consider the evidence of an

alternative cause when evaluating petitioner's prima facie case. Stone v. Sec'y of Health & Human Servs., 676 F.3d 1373, 1380 (Fed. Cir. 2012).

Analysis

A critical issue is whether Mr. Germaine can establish a medical theory connecting the third dose of a rotavirus vaccine to intussusception. The Secretary also offers a norovirus infection as an alternative cause of C.G.'s intussusception.

As background for analyzing the rotavirus vaccine at issue, the history of rotavirus vaccines helps to understand which rotavirus vaccine(s) the medical literature is addressing. See Carda v. Sec'y of Health and Human Servs., No. 14-191V, 2017 WL 6887368 (Fed. Cl. Spec. Mstr. Nov. 16, 2017). The first rotavirus vaccine, RotaShield (RV4), was approved in 1998 (but then withdrawn in 1999) and was administered in three doses.³ The second rotavirus vaccine, RotaTeq (RV5), was approved in 2006 and is administered in three doses.⁴ The third rotavirus vaccine, Rotarix (RV1), was approved in 2008 and is administered in two doses. Exhibit 9 (Rotarix Package Insert).

The Secretary considered the epidemiological literature cited in this case when adding the first two doses of the available rotavirus vaccines to the Vaccine Table. Resp't's Br. at 9 n.9 (citing National Vaccine Injury Compensation Program: Addition of Intussusception as Injury for Rotavirus Vaccines to the Vaccine Injury Table, 80 Fed. Reg. 35848 (June 23, 2015) (codified at 42 C.F.R. § 100.3)). The Secretary separately discussed the evidence supporting adding the RotaTeq and Rotarix vaccines to the Vaccine Table. 80 Fed. Reg. 35848.

Since the rotavirus vaccines differ, it is relevant to determine which rotavirus vaccine C.G. received. Broekelschen v. Sec'y of Health & Human Servs., 618 F.3d 1339, 1345 (Fed. Cir. 2010) ("petitioner must provide a reputable medical or scientific explanation that pertains specifically to the petitioner's case"); Davis v. Sec'y of Health & Human Servs., No. 07-451V, 2010 WL 1444056, at *11 (Fed. Cl. Spec. Mstr. Mar. 16, 2010) (finding that petitioner must establish that

³ Rotavirus Vaccine (RotaShield®) and Intussusception, Center for Disease Control and Prevention, [https://www.cdc.gov/vaccines/vpd-vac/rotavirus/vac-rotashield-historical.htm#\(concurrently filed as court exhibit 1001\)](https://www.cdc.gov/vaccines/vpd-vac/rotavirus/vac-rotashield-historical.htm#(concurrently%20filed%20as%20court%20exhibit%201001)).

⁴ RotaTeq Package Insert, Merck & Co., Inc., https://www.merck.com/product/usa/pi_circulars/r/rotateq/rotateq_pi.pdf (concurrently filed as court exhibit 1002).

information about one vaccine is transferable to another vaccine), mot. for rev. denied, 94 Fed. Cl. 53 (2010), aff'd, 420 F. App'x 973 (Fed. Cir. 2011). While the vaccine administration records do not specify which brand of rotavirus vaccine C.G. received, the person accompanying C.G. at the October 5, 2016 appointment reported that C.G. should receive no RotaTeq vaccinations. Exhibit 3 at 25. It can also be inferred that C.G. received RotaTeq because RotaTeq was the only three-dose rotavirus vaccine being offered during the relevant time period.

Having found that C.G. received the RotaTeq vaccine, the undersigned turns to whether Mr. Germaine has established a medical theory connecting the third dose of the RotaTeq vaccine and intussusception.

A. Althen Prong One – Medical Theory

1. Arguments and Evidence concerning a Medical Theory

Mr. Germaine's attempt to meet his burden of proof to establish that the third dose of the RotaTeq vaccine can cause intussusception relies upon two different methods.⁵ First, Mr. Germaine supports his position by offering Dr. Santoro's opinion to propose a medical theory. Second, Mr. Germaine offers epidemiologic evidence that purportedly shows an increased risk of intussusception following the third dose of rotavirus vaccine.

For a biological mechanism on how the third dose of the RotaTeq vaccine can cause intussusception, Mr. Germaine is not clear. Mr. Germaine recognizes that the mechanism is unknown but also proposes that intussusception is caused by an inflammatory response in the lymphatic tissue or intestines from the replication

⁵ In his brief, Mr. Germaine presented contradictory positions on the evidentiary standard of a medical theory. Mr. Germaine initially presented the preponderance of the evidence standard for a medical theory from Althen but then asserted that a medical theory need only be biologically plausible. Compare Pet'r's Br. at 4 with Pet'r's Br. at 5 (citing Andreu v. Sec'y of Health and Human Services, 569 F.3d 1367, 1375 (Fed. Cir. 2009)). However, Dr. Santoro more clearly stated his opinions about the medical theory to "a reasonable degree of medical and scientific probability" and to "a high degree of medical certainty." Exhibit 6 at 11. Thus, despite the discrepancy, Mr. Germain appears to be seeking to establish his medical theory in line with the level of proof confirmed by the Federal Circuit. Boatmon v. Sec'y of Health & Human Servs., 941 F.3d 1351, 1360 (Fed. Cir. 2019) (holding that a "plausible" medical theory did not satisfy petitioner's burden of proof); see also Kottenstette v. Sec'y of Health & Human Servs., No. 15-1016V, 2020 WL 953484, at *3 (Fed. Cl. Feb. 12, 2020) (deeming the "biologic credibility" standard as akin to the invalid "plausibility" standard and striking it down in accordance with Boatmon), appeal docketed No. 2020-2282 (Fed. Cir. Sep. 17, 2020).

of the rotavirus. Pet'r's Br. at 8 (citing exhibit 10 at 4), 12-13 (citing exhibit 15 at 7).⁶

The Secretary agrees that the biological mechanism is unknown but does not address Mr. Germaine's proposed mechanism of "inflammatory response." Resp't's Br. at 8-9; exhibit A at 5. Rather than focus on the mechanism, the Secretary noted that the relationship between some (but not all) doses of rotavirus vaccines and intussusception has been established by epidemiology. Resp't's Br. at 8-9. When amending the Vaccine Table, the Secretary believed that the time ranges for intussusception following the first two doses of the rotavirus vaccines (1-21 days) were "generous." 80 Fed. Reg. at 35848. On the broadest level, by placing some doses of the rotavirus vaccines on the Vaccine Table, the Secretary has implicitly acknowledged that a biological mechanism of rotavirus vaccines causing intussusception exists in some circumstances. However, a biological mechanism is not the end, because the Vaccine Table distinguishes between the rotavirus vaccine doses based on epidemiology. The undersigned finds that Mr. Germaine has not carried his burden of proof based on the biological mechanism alone and now looks to the epidemiological evidence.

Beyond proposing a biological mechanism, Mr. Germaine cites epidemiological evidence to support a connection between the third dose of the RotaTeq vaccine and intussusception. While the undersigned has reviewed and considered all the medical literature, the following articles are the most substantive evaluations of the relevant issue. The list of articles summarized below does not include studies solely focused on the (two-dose) Rotarix vaccine. See Appendix 1. Mr. Germaine has not presented any persuasive explanation for why studies about a two-dose rotavirus vaccine inform an analysis of a vaccine given in three doses. Thus, this literature focused solely on the Rotarix vaccine has little impact on the issue of adverse effects following the third dose of the RotaTeq vaccine. See Kottenstette v. Sec'y of Health & Human Servs., No. 15-1016V, 2020 WL 953484, at *5 (Fed. Cl. Feb. 12, 2020) (studies related to one formulation of a vaccine cannot automatically be attributed to a different formulation of the vaccine).

⁶ To support this mechanism, Mr. Germaine also cites, without discussion, exhibits 7, 10, 11. Pet'r's Br. at 8 n.2. These citations do not add any support to Mr. Germaine's proposed mechanism. Exhibit 7 is Dr. Santoro's curriculum vitae, exhibit 10 (Patel) was already cited in the body of Mr. Germaine's brief, and exhibit 11 (Greenberg) discusses Patel but does not address a biological mechanism.

a) Weintraub (exhibit 12)

Weintraub accessed medical records from several integrated health care organizations to identify intussusception after rotavirus vaccinations. Weintraub searched for occurrences of intussusception in the medical records and followed patients with weekly updated records to track any adverse events. Weintraub compared the risks between the (two-dose) Rotarix vaccine (over 200,000 doses) and the (three-dose) RotaTeq vaccine (nearly 1.3 million doses). Exhibit 12 at 1.

Weintraub reached different conclusions for the different vaccines. Following the Rotarix vaccine, risk of intussusception increased significantly. But, following the RotaTeq vaccine, there was no significant increased risk of intussusception. *Id.* at 6-7. Qualifying the conclusion about Rotarix vaccine, Weintraub noted that the increased risk of intussusception could be a result of chance due to the small number of intussusception cases. *Id.* at 7.

Mr. Germaine focused entirely on Weintraub's conclusion about the Rotarix vaccine without addressing the qualification that the increased risk of intussusception may be entirely a result of chance. Pet'r's Br. at 6-7. Moreover, Mr. Germaine does not even mention Weintraub's conclusion that there was no significant increased risk of intussusception following the RotaTeq vaccine, the vaccine relevant to this case.

b) Yih (exhibit 13, A-4)

Yih used data from three American health insurance carriers to study instances of intussusception. Yih identified the instances through procedural and diagnostic codes. Medical record review then confirmed the rotavirus vaccination and the intussusception events.

Yih primarily concluded that "there was no significant increase in reporting after dose 2 or dose 3 [of the RotaTeq vaccine]." Exhibit 13 at 1. Yih did qualify that conclusion adding that "an increased risk associated with [the second and third] doses cannot be ruled out, given the overlapping confidence intervals of the risk estimates for doses 1, 2, and 3." *Id.* at 7.

Mr. Germaine appears to have incorrectly characterized the primary conclusion in Yih relating to the third dose of rotavirus vaccine stating that, "nearly all the results ... yielded a statistically significant increase in attributable risk of intussusception after rotavirus infection." Pet'r's Br. at 12. As noted above, Yih found no significant increased risk of intussusception following the third dose of RotaTeq vaccine. While Mr. Germaine highlighted that Yih noted "a major challenge in studying rotavirus vaccines and intussusception is the strong

confounding effect of age,” exhibit 13 at 2, the Secretary countered that Yih accounted for age in the statistical analysis. Resp’t’s Br. at 10-11 (citing exhibit 13 at 3-4).

c) Haber (exhibit 8, A-7)

Haber is a statistical analysis of intussusception events reported to the Vaccine Adverse Event Report Systems (VAERS). Haber analyzed intussusception events related to the three-dose rotavirus vaccine, RotaTeq, and to the two-dose rotavirus vaccine, Rotarix. Haber focused on determining whether the incidence of intussusception increased after a rotavirus vaccine, how many days after, and after which doses. Exhibit 8 at 1.

Haber concluded that “there was no significant increase in reporting after dose 2 or dose 3 [of the RotaTeq vaccine].” *Id.* Haber concluded that there only was only a small increase in intussusception events for three to six days after the first dose of the RotaTeq vaccine.⁷

Mr. Germaine concedes that the VAERS data analyzed in Haber is “not as reliable as controlled studies,” but asserts that the data shows a “consistent relationship between rotavirus vaccine and intussusception.” Pet’r’s Br. at 7. Mr. Germaine does not address Haber’s conclusion that there was no significant increase in intussusception after the third dose of the RotaTeq vaccine.

d) Koch (exhibit 14, A-6)

Koch is a systemic literature review and meta-analysis of studies on the relationship between rotavirus vaccines and intussusception. Koch used the data underlying these studies to calculate the risk of intussusception from rotavirus vaccine. Some of the studies underlying Koch’s analysis were cited by the parties: Haber (exhibit 8), Patel (exhibit 10), Yih (exhibit 13), and Escolano (exhibit A-5).

Koch concluded that “there is no increase in risk after the third dose of the [RotaTeq] vaccine.” Exhibit 14 at 6. Koch does not list any attributable risk for the third dose in a table of calculations. *Id.*, Table 2. In the “Key Messages” section, Koch does not mention any risk of intussusception from the third dose of the RotaTeq vaccine. *Id.* at 7.

⁷ Because there were insufficient numbers of intussusception events reported after the Rotarix vaccine, Haber was unable to conduct a statistical analysis and could only offer a descriptive analysis.

Mr. Germaine apparently disputes Koch’s conclusion stating that Koch “found an increase in risk of intussusception after all three doses of the [rotavirus] vaccination.” Pet’r’s Br. at 12 (citing exhibit 14 at 5). Mr. Germaine does not explain why Koch’s conclusion is incorrect or how it can co-exist with his own conclusion. From Mr. Germaine’s citation, he may be referencing Koch’s statement that “the pooled estimate of the [relative risk] after the third dose of RV5 was 1.14 [0.75; 1.74].” Exhibit 14 at 5. Neither Mr. Germaine nor Dr. Santoro explain the significance of this quotation or anything other statistical calculations made by Koch.

The undersigned finds that the weight of epidemiological evidence does not support the third dose of RotaTeq vaccine causing intussusception for any period of time following vaccination, let alone eighteen days following vaccination.

2. Evaluation of Evidence concerning the Medical Theory

The weight of epidemiological evidence does not support the third dose of RotaTeq vaccine causing intussusception for any period of time following vaccination, let alone eighteen days following vaccination. For a lengthy discussion of the value of epidemiologic studies in the Vaccine Program, see Tullio v. Sec’y of Health & Human Servs., No. 15-51V, 2019 WL 7580149, at *5-8 (Fed. Cl. Spec. Mstr. Dec. 19, 2019), mot. for rev. denied, 149 Fed. Cl. 448, 475 (2020). Mr. Germaine admitted that the biological mechanism for rotavirus vaccine causing intussusception is unknown and presented minimal evidence to support a mechanism. The undersigned finds that Mr. Germaine has not established a persuasive theory by a preponderance of the evidence and, thus, he cannot establish all the elements to prevail on his claim.

B. Alternative Causation

The Secretary argued in the alternative that C.G. developed intussusception because of his norovirus infection. Resp’t’s Br. at 16. Mr. Germaine admitted that he and another member of the household were sick with a gastrointestinal illness days prior to C.G. developing diarrhea and vomiting. Exhibit 1 ¶ 4. C.G. tested positive for norovirus on the day that he developed his symptoms. Exhibit 4 at 15.

The Secretary asserted that norovirus has been associated with severe gastrointestinal symptoms, including intussusception. Resp’t’s Br. at 17 (citing exhibit A-10 (Petragnani) at 8, exhibit A-11 (Okimoto) at 3); exhibit A at 4. Addressing the Okimoto study, Dr. Santoro noted that few of the patients with intussusception also had norovirus (4 of 44) and suggested that even this correlation may be exaggerated since norovirus is a very common infection.

Exhibit 22 at 4. Dr. Santoro emphasized that the adenovirus in the Okimoto study showed a much higher correlation with intussusception (22 of 44) than norovirus. Id. Mr. Germaine critiqued the literature review in Petraghani for including a majority of data about patients five years or older, not stating a definition of intussusception to confirm diagnosis, and finding only four papers (of 176 reviewed) that mentioned intussusception. Pet'r's Br. at 16-17.

Because Mr. Germaine has not carried his burden regarding the elements of his case, the burden has not shifted to the Secretary to present an alternative cause for C.G.'s intussusception. LaLonde v. Sec'y of Health & Human Servs., 746 F.3d 1334, 1340 (Fed. Cir. 2014). Accordingly, the undersigned reaches no finding as to whether norovirus can cause intussusception.

Conclusion

Mr. Germaine has not established that he is entitled to compensation on behalf of C.G. The Clerk's Office is directed to enter judgment in accord with this decision unless a motion for review is filed.

IT IS SO ORDERED.

s/Christian J. Moran
Christian J. Moran
Special Master

Appendix 1:

Medical literature that substantively analyzes the three-dose RotaTeq (RV5) vaccine

Exhibit #	Citation
8, A-7	Penina Haber et al., <u>Intussusception After Rotavirus Vaccines Reported to US VAERS, 2006–2012</u> , 131 Pediatrics 1042 (2013).
12	Eric Weintraub et al., <u>Risk of Intussusception after Monovalent Rotavirus Vaccination</u> , 370 New Engl. J. Med. 513 (2014).
13, A-4	W. Katherine Yih, <u>Intussusception Risk after Rotavirus Vaccination in U.S. Infants</u> , 370 New Engl. J. Med. 503 (2014).
14, A-6	Judith Koch, <u>The Risk of Intussusception after Rotavirus Vaccination- a systemic literature review and meta-analysis</u> , 114 Dtsch Arztebl. Int. 255 (2017).
15	Catherine Yen, <u>Rotavirus vaccination and intussusception – Science, surveillance, and safety: A review of evidence and recommendations for future research priorities in low and middle income countries</u> , 12 Hum. Vacc. & Immunotherapeutics 2580 (2016).
21	Stephan Foster, <u>Rotavirus Vaccine and Intussusception</u> , 12 J. Pediatr. Pharmacological Therapeutics 4 (2007).
A-5	Sylvie Escolano et al., <u>Intussusception risk after RotaTeq vaccination: Evaluation from worldwide spontaneous reporting data using a self-controlled case series approach</u> , 33 Vaccine 1017 (2015).
A-9	Guadalupe Quintero-Ochoa et al., <u>Viral agents of gastroenteritis and their correlation with clinical symptoms in rotavirus-vaccinated children</u> , 73 Infect., Genet. & Evol. 190 (2019).

Appendix 2:**Medical literature that does not substantively analyze
the three-dose RotaTeq (RV5) vaccine**

Exhibit #	Citation	Vaccine Analyzed (if any)
9	Rotarix® Package Insert, GlaxoSmithKline (2019).	Two-dose Rotarix vaccine
10	Manish Patel et al., <u>Intussusception Risk and Health Benefits of Rotavirus Vaccination in Mexico and Brazil</u> , 364 New Engl. J. Med. 2283 (2011).	Two-dose Rotarix vaccine
11	Harry Greenberg, <u>Rotavirus Vaccination and Intussusception — Act Two</u> , 364 New Engl. J. Med. 2354 (2011).	Two-dose Rotarix vaccine
16	Kelly Warfield et al., <u>Rotavirus Infection Enhances Lipopolysacchande-Induced Intussusception in a Mouse Model</u> , 80 J. Virology 12377 (2006).	Three-dose Rotashield vaccine
17	Christine Robinson et al., <u>Evaluation of Anatomic Changes in Young Children with Natural Rotavirus Infection: Is Intussusception Biologically Plausible?</u> , 189 J. Infect. Disease 1382 (2004).	Three-dose Rotashield vaccine
18	Shinichiro Hirokawa, <u>Ileoileal Intussusception and Ileal Stricture Associated with Necrotizing Enterocolitis in a Premature Infant: Report of a Case</u> , 31 Surg. Today 1097 (2001).	none
19	Emrah Aydin, <u>Intussusception in a preterm newborn</u> , 59 Pedia. & Neonatology 312 (2018).	none
20	Jeannette Guamer et al., <u>Intestinal Intussusception Associated With Adenovirus Infection in Mexican Children</u> , 120 Am. J. Clin. Pathol. 845 (2003). ⁸	none

⁸ Mr. Germaine submitted an incomplete version of this exhibit that contains little text. Upon review of the complete article, Guarner discusses an association between adenovirus and

23	Jae Hyun Park et al., <u>Intussusception Associated With Pseudomembranous Colitis</u> , 46 J. Pediatr. Gastro. & Nutrition 470 (2008). ⁹	none
A-1	Anthony Manning, <u>Intussusception in Infants and Children in Pediatric Gastrointestinal and Liver Disease</u> (Robert Wyllie et al. eds., 5th ed. 2016) at 607.	none
A-2	H.M.L. Carty, <u>Paediatric emergencies: non-traumatic abdominal emergencies</u> , 12 Europ. Radiol. 2835 (2002).	none
A-3	Shobhit Jain et al., <u>Child Intussusception</u> , NCBI Bookshelf, National Library of Medicine, National Institutes of Health (2019).	none
A-8	Z.A. Marsh et al., <u>The unwelcome houseguest: secondary household transmission of norovirus</u> , 146 J. Epidemiol. Infect. 159 (2018).	none
A-10	Mariska Petrignani et al., <u>Chronic sequelae and severe complications of norovirus infection: A systematic review of literature</u> , 105 J. Clin. Virology 1 (2018).	none
A-11	Satoshi Okimoto et al., <u>Association of viral isolates from stool samples with intussusception in children</u> , 15 Int. J. Infect. Diseases e641 (2011).	none
A-12	David Galloway et al., <u>Infectious Diarrhea, Clostridium Difficile in Pediatric Gastrointestinal and Liver Disease</u> (Robert Wyllie et al. eds., 5th ed. 2016) at 458.	none
A-13	Priya Farooq et al., <u>Pseudomembranous colitis</u> , 61 Disease-a-Month 181 (2015).	none
A-14	Evon Zoog et al., <u>Adult Intussusception Caused by Ileocecal Clostridium difficile</u>	none

intussusception but does not address any vaccines. A complete copy of the Guarner article is filed concurrently as court exhibit 1003.

⁹ While Mr. Germaine cited the first author of exhibit 23 to be J. Kim, the first author actually appears to be Jae Hyun Park.

	<u>Pseudomembranous Colitis</u> , 82 Am. Surg. E153 (2016).	
A-15	Gé-Ann Kuiper et al., <u>Clostridium difficile infections in young infants: Case presentations and literature review</u> , 10 IDCases 7 (2017).	none